Scientific report

Regarding the implementation of the project "Transdermal patch developed by laser-based methods for cardiovascular disease" in the period January–November 2013

Name of the phase: Intermediary phase III/2013 with the objectives:

- elaborate a *report on the optimal deposition parameters of the polymer layers which form a patch* (PIB/EC/HPMC); **(month 3)**
- elaborate a *report on the optimal laser deposition parameters of the polymer layers which form a patch* (PIB/EC/HPMC) *and contain the drug to be released* (Captopril); **(month 12)**
- elaborate a *report on the morphological and chemical characteristics of the deposited layers*; **(month 3)**
- elaborate a *report on the drug release;* **(month 12)**
- and carry out dissemination activities: *participation at one conference and publishing two papers* **(month 3** and **month 12)**.

Value of the project from the national budget for 2013: 248750 lei.

The activities carried out in phase III/2013, according to the Gantt diagram from the project proposal are:

- **A 2.2** MAPLE of polymer mixtures (in WP 2).
- **A 2.3** MAPLE of polymer multilayers and mixtures which contain active drug (Captopril).
- **A 3.1** Morphologic characterization of the thin films deposited by atomic force microscopy AFM, scanning electron microscopy SEM, and contact angle measurements (in WP 3).
- **A 3.2** Chemical characterization of the thin films by FTIR, UV-VIS (in WP 3).
- **A 3.3** Determination of the drug load in the polymer thin film. Spectrophotometric measurements.
- **A 4.1** *In vivo* tests.
- **A 4.2** *Ex vivo* tests.
- **A 5.1** and **A 5.2** Dissemination activities: Participation at one conference and publication of two papers in ISI journals.

Conclusions:

In conclusion, it can be pointed out that the objectives of the 3rd phase were achieved. The following results were obtained:

- The control of the experimental conditions of the multilayer films (laser fluence, annealing temperature, etc.) lead to the control over the surface of the films, and thus to the control over the drug release profile.
- In the case of the multilayer films PIB/EC/HPMC, a combination of islands and pores was noticed, which suggests a phase combination.
- The ability to control the morphologic and structural properties of the polymers which form the multilayer films proves that MAPLE is a useful technique for the fabrication of controlled drug systems.
- First studies regarding the modification of the films' structure when exposed to different media as well as the way in which the films release the drug (through diffusion) have shown that the formation and control of the dimension of the pores is very important (as this is the route to drug release).
- The dissemination activities have been accomplished by *participation at two conferences* and *publishing two papers*.
- The information on the webpage have been actualized.
- Activities corresponding to the 4th phase have been planned, i.e. the *in vivo* and *ex vivo* tests.

Project director,
Alexandra Palla Papavlu

_____